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**APPLICATION**

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**FOR UNITED STATES LETTERS PATENT**

15 **TITLE:** COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINE

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**SPECIFICATION**

30 **TO ALL WHOM IT MAY CONCERN:**

BE IT KNOWN THAT I, Jamie L. Toscano, a citizen of the USA, have invented new and useful improvements in a cooling system for internal combustion engine as described in this specification:

## **BACKGROUND OF THE INVENTION**

### **Field of the Invention**

5 The present invention relates to a cooling system for internal combustion engine for use in connection with heat exchangers. The cooling system for internal combustion engine has particular utility in connection with cooling systems for internal combustion engines that utilize a refrigerant compressor and evaporator.

### **10 Description of the Prior Art**

Cooling system for internal combustion engines are desirable for reducing the thermal load of engines and allowing them to operate with greater efficiency and lubrication lifetime.

15 The use of heat exchangers is known in the prior art. For example, United States Patent Number 4,776,181 to Maule discloses a evaporative heat exchanger that has recirculating coolant from an engine passes through tubes in a heat exchanger pressure vessel. A cooling medium is directed onto the exterior surfaces of the tubes, and the pressure within the vessel is reduced to lower the temperature of evaporation of the cooling medium. A thermostatic control reduces or prevents the flow of engine coolant to the tubes when the coolant temperature falls below the temperature of evaporation of the cooling medium. However, the Maule '181 patent does not 20 remove engine thermal energy by the use of a compressor driven refrigeration unit having an electronic expansion valve to meter the unit.

25 Similarly, United States Patent Number 3,070,975 to Cornelius discloses a structure for cooling water heated in cooling automobile engine that has a water cooled engine manifold block, a radiator for cooling the water heated in cooling the engine manifold block, and a water pump to pick up the cooled water for the radiator for recirculation to the engine manifold block. The combination of an automobile air conditioning system comprising in the engine compartment successively in line a refrigerant compressor to deliver refrigerant therefrom as a hot pressurized gas. A condenser in which to cool and liquefy the refrigerant, a dryer to absorb any moisture from the refrigerant, an expansion valve through which the refrigerant may be

needed to relieve the pressure thereon. An evaporator in the passenger compartment to pick up heat therefrom to evaporate part of the refrigerant into a gas, a return refrigerant conduit into the engine compartment with one end connected to the evaporator. The engine compartment also having a return refrigerant conduit separate therefrom for delivery of return refrigerant through an 5 end thereof connected to the compressor. A hot water return conduit with one end connected to the engine manifold block, a hot water return conduit separate therefrom for delivery of hot water through an end thereof into the radiator. A heat exchanger spaced from the engine an a heat exchanger coil passing sealably therethrough with one of the heat exchanger and the heat exchanger coil having its opposite ends connected to the other ends of the hot water return 10 conduit. The other of the heat exchanger and the heat exchanger coils having its opposite ends connected to the other ends of the return refrigerant conduits whereby the hot water is cooled in passage to the radiator. The return refrigerant is evaporated to pass in gaseous state into the compressor. However, the Cornelius '975 patent does not remove engine thermal energy by the use of a compressor driven refrigeration unit having an electronic expansion valve to meter the 15 unit.

Lastly, United States Patent Number 2,776,648 to Taylor, Jr. discloses an engine cooling process which comprises circulating water through an engine, passing the resulting heated fluid in heat exchange relation with a liquid refrigerant having a freezing point below the freezing point of water and a boiling point below the boiling point of water. Transferring heat from the 20 fluid to the refrigerant, returning the exit water formed from the fluid to the engine and circulating the heated refrigerant through an air cooled condenser. However, the Taylor, Jr. '648 patent does not remove engine thermal energy by the use of a compressor driven refrigeration unit having an electronic expansion valve to meter the unit.

While the above-described devices fulfill their respective, particular objectives and 25 requirements, the aforementioned patents do not describe a cooling system for internal combustion engine that allows cooling systems for internal combustion engines that utilize a refrigerant compressor and evaporator. The Maule '181, Cornelius '975 and Taylor, Jr. '648 patents make no provision for removal of engine thermal energy by the use of a compressor driven refrigeration unit having an electronic expansion valve to meter the unit.

The invention may also include a high side line, a first low side line and a second low side line. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject matter of the claims attached.

Numerous objects, features and advantages of the present invention will be readily apparent 5 to those of ordinary skill in the art upon a reading of the following detailed description of presently preferred, but nonetheless illustrative, embodiments of the present invention when taken in conjunction with the accompanying drawings. In this respect, before explaining the current embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in 10 the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of descriptions and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which this 15 disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

It is therefore an object of the present invention to provide a new and improved cooling 20 system for internal combustion engine that has all of the advantages of the prior art heat exchangers and none of the disadvantages.

It is another object of the present invention to provide a new and improved cooling system for internal combustion engine that may be easily and efficiently manufactured and marketed.

25 An even further object of the present invention is to provide a new and improved cooling system for internal combustion engine that has a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such cooling system for internal combustion engine economically available to the buying public.

30 Still another object of the present invention is to provide a new cooling system for

internal combustion engine that provides in the apparatuses and methods of the prior art some of the advantages thereof, while simultaneously overcoming some of the disadvantages normally associated therewith.

5       Lastly, it is an object of the present invention is to provide a cooling system for internal combustion engine for cooling systems for internal combustion engines that utilize a refrigerant compressor and evaporator.

10      These together with other objects of the invention, along with the various features of novelty that characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

15      The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

20      Figure 1 is a top perspective view of the preferred embodiment of the cooling system for internal combustion engine constructed in accordance with the principles of the present invention.

Figure 2 is a cross section view of the cooling system for internal combustion engine of the present invention.

Figure 3 is a block diagram view of the cooling system for internal combustion engine of the present invention.

25      The same reference numerals refer to the same parts throughout the various figures.

all of which fall within the true spirit and scope of the invention. With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art,  
5 and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention. For example, any suitable sturdy material such as composite or plastic may be used instead of the metal compressor described. And although cooling systems for internal combustion engines that utilize a refrigerant compressor and evaporator have been described, it should be appreciated that the cooling system for internal  
10 combustion engine herein described is also suitable for cooling aircraft engines.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to,  
15 falling within the scope of the invention.